

month follow-up, 42 completed Lysholm and IKDC questionnaires and the average reported scores are 84.9 and 74.5%. No correlation between 6-month outcome scores and pre-operative expectations has yet to be shown.

**Conclusion:** When using validated outcome measures to determine expectations, patients have higher expectations than surgeons with regard to ultimate function and pain after ACLR. This study is the first to assess the differences in expectations of patients v. surgeons prior to ACLR. Further data collection will determine if any correlation of expectation to ultimate outcome is observed.

### Does Proximal-Distal Tibial Tunnel Placement for PCL Reconstruction Matter?

SS-20

April 14, 2:05 PM

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**Introduction:** The purpose of this study was to investigate the biomechanical effects of proximal-distal tibial tunnel placement on posterior laxity in PCL reconstruction.

**Methods:** Eighteen human cadaveric knees were studied, consisting of nine matched pairs. Transtibial PCL reconstruction was performed using a simulated arthroscopic technique. The native PCL was resected, and Achilles tendon autografts were used for PCL reconstruction. The specimens were divided into two groups based on tibial tunnel placement: 1) anatomic tunnel and 2) non-anatomic tunnel. The anatomic tibial tunnel was placed at the footprint of the PCL, 1 cm distal to the joint line, while the non-anatomic tibial tunnel was placed more proximal to this, at the joint line. A 150-N cyclic posterior tibial load was applied using a Materials Testing System (MTS) machine at 0°, 30°, 60°, and 90° of knee flexion. In 10 specimens, a static 250-N posterior tibial load was applied at 90° of knee flexion. Posterior tibial translation in the sagittal plane was recorded. A Mann-Whitney U test was used to compare posterior tibial translation between the two groups. Statistical significance was set defined as  $p < 0.05$ .

**Results:** With application of a 150-N posteriorly directed cyclic force, the anatomic tunnel group demonstrated significantly less posterior tibial translation than the non-anatomic tunnel group at 0°, 30°, 60°, and 90° of knee flexion ( $p < 0.05$ ). The anatomic tunnel group also demonstrated significantly less posterior tibial translation than the non-anatomic tunnel group at 90° with a static 250-N posteriorly directed force applied ( $p < 0.05$ ).

**Conclusion:** Anatomic distal tibial tunnel placement recreating the tibial origin of the PCL provided significantly greater restraint to posterior tibial translation than proximal non-anatomic tunnel placement. We recommend careful placement of an anatomic distal tibial tunnel during PCL reconstruction for avoidance of posterior laxity.

### Predictors of Recurrent Patellar Instability in Children and Adolescents following First-Time Dislocation

SS-21

April 14, 3:35 PM

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**Introduction:** The purpose of the study was to examine risk factors in patients with first-time patellofemoral dislocations to develop a prediction model of recurrence.

**Methods:** A single institution retrospective review of all patients with a first-time patellofemoral dislocation from 2002 – 2013 was performed. Demographic risk factors (age, gender, laterality, mechanism of injury, and history of contralateral patellar dislocation) and radiographic risk factors (increased patella height, trochlear dysplasia, and skeletal immaturity) were examined. Patella height was measured using Caton-Deschamps index. Trochlear dysplasia was assessed using the two-grade Dejour classification and skeletal immaturity was assessed based on the distal femur and proximal tibia physis (open, closing, or closed).

**Results:** 266 knees in 250 patients were included in the study. Of these, 222 (83.5%) were treated nonoperatively and 44 (16.5%) were treated surgically. Of the knees treated nonoperatively, 77 (34.7%) had a recurrence. Significant risk factors for recurrence on univariate analysis were age  $\leq 14$  years, history of contralateral patellar dislocation, trochlear dysplasia, skeletal immaturity, and a Caton-Deschamps index  $> 1.45$ . Multivariate analysis was performed and trochlear dysplasia and skeletal immaturity were the most significant factors with odds ratios of 3.56 and 2.23 respectively. The presence of all four multivariate risk factors (CDI  $> 1.45$ , history of contralateral patellar dislocation, trochlear dysplasia, and skeletal immaturity) had a predicted risk of recurrence of 88%. The presence of any three risk factors had a predicted risk of about 75% and the presence of any two risk factors had a predicted risk of about 55%.

**Conclusion:** Trochlear dysplasia, skeletal immaturity, CDI  $> 1.45$ , and a history of contralateral patellar dislocation were all significant risk factors for recurrence in patients with first-time patellar dislocations. A predictive model for calculation of recurrence risk was developed. This information is useful when counseling patients and their families following first-time patellar dislocation about prognosis.

### The Anatomic Midpoint of the Anterior Attachment of the Medial Patellofemoral Complex

SS-22

April 14, 3:40 PM

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**Introduction:** The reconstruction of the medial patellofemoral ligament (MPFL) and medial quadriceps tendon

femoral ligament (MQTFL) has been described in the treatment of patellar instability. The purpose of this study was to identify and describe the anatomic midpoint of the anterior attachment of the combined MPFL and MQTFL (termed the medial patellofemoral complex [MPFC]).

**Methods:** Photographs of 31 cadaveric knee dissections were available for computer-assisted analysis. Using AutoCAD software, a bisecting line was created to identify the midpoint of the MPFC attachment. An anatomic reference point was identified at the intersection of the line along the medial border of the quadriceps tendon and the superior articular border of the patella (P1), and the distance to the midpoint was calculated on the basis of the patellar articular length (PAL).

**Results:** Of the 31 cadaveric knee photographs, 25 had appropriate quality and landmarks for digital analysis. Of these 25 knees, 22 had MPFL and MQTFL fibers, 2 had MQTFL fibers only, and 1 had MPFL fibers only. The midpoint of the MPFC was  $3.2 \pm 5.9$  mm ( $9.0\% \pm 16.4\%$  PAL) proximal to P1. After exclusion of the 2 knees with MQTFL fibers only, the MPFC midpoint was  $1.9 \pm 3.1$  mm ( $5.3\% \pm 8.6\%$  PAL) proximal to P1. In all knees, the anatomic midpoint of the MPFC was at or proximal to the level of P1.

**Conclusion:** In our anatomic study, the midpoint of the MPFC was found to be at or proximal to the junction of the medial border of the quadriceps tendon and superior pole of the patella. Given the risk of patellar fracture after traditional MPFL reconstruction, further consideration should be given to the analogous MQTFL reconstruction as a potentially safer and more anatomic alternative in the treatment of patellar instability.

### **Anisometry of Medial Patellofemoral Ligament Reconstruction in the Setting of Patella Alta and Increased Tibial Tubercle-Trochlear Groove (TT-TG) Distance**

**SS-23**

April 14, 3:45 PM

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**Introduction:** To assess the effect of increased lateralization and proximalization of the tibial tubercle (TT) on isometry of the reconstructed medial patellofemoral ligament.

**Methods:** Ten fresh-frozen cadaveric knees were placed on a custom testing fixture. A tunnel was drilled under fluoroscopic guidance from Schottle's point through the lateral femoral cortex. A suture anchor was placed at the upper 41% of the medial border of the patella and the sutures were shuttled through to the lateral side and attached to a pulley with a 1N weight. Retroreflective markers were attached to the suture and MPFL length change, as measured by suture marker motion, was assessed using a 3D motion capture system through

a range of motion between 0deg and 110deg with the native TT anatomy. Recordings were repeated after a flat TT osteotomy and transfer to TT-TGs of 20mm and 25mm and Caton Deschamps (C/D) ratios of 1.2 and 1.4, including all combinations. Generalized estimating equation (GEE) modeling technique was used to analyze and control for the clustered nature of the data. SAS version 9.3 was used for all data analyses.

**Results:** Analysis was performed on 9 specimens secondary to significant deviations in the baseline normative data. Intact knees showed MPFL isometry through 20-70 degrees range of motion. Tibial tubercle lateralization significantly altered MPFL isometry with a threshold TT-TG of 25mm ( $p=0.045$ ). Patella alta significantly altered MPFL isometry with a threshold C/D of 1.4 ( $p=0.025$ ). The effect of TT lateralization combined with patella alta compounded the anisometry, lowering the threshold for patella alta to a C/D of 1.2 when combined with a TT-TG of 25mm ( $P<0.001$ ).

**Conclusion:** An isolated MPFL reconstruction may be prone to failure in the setting of patella alta and/or elevated TT-TG given the anisometry demonstrated. Consider a tibial tubercle transfer in these patients.

### **Biomechanical Comparison of Torque to Humeral Fracture Between Two Biceps Tenodesis Locations**

**SS-24**

April 15, 9:45 AM

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**Introduction:** Tenodesis of the long head of the biceps is the preferred surgical treatment for pathology of the tendon. Several case reports have shown fracture of the humerus following subpectoral biceps tenodesis; the location of the tenodesis was implicated as a stress riser for fracture. The purpose of our study is to compare the likelihood of spiral fracture of the humerus following biceps tenodesis at the position of arthroscopic supra-pectoral tenodesis versus the subpectoral meta-diaphyseal location.

**Methods:** 16 fresh-frozen humeri (8 matched pairs) were dissected and intraosseous tenodesis was performed. Unicortical tenodesis holes were drilled at the bottom of the bicipital groove (Group 1, suprapectoral), or just below the pectoralis major tendon insertion (Group 2, subpectoral) in the humeral diaphysis. The tenodesis was performed in a bone tunnel with a validated technique using suture fixation. Each humerus was mounted to a load frame and rotation torque was applied distally until fracture occurred, with torque measured (N-m).

**Results:** Fracture occurred at the subpectoral cortical drill hole in 8 of 8 specimens (Group 2). Only two fractures occurred through the tenodesis hole in Group 1, with spiral fracture resulting in the diaphysis of the humerus in